

# **HC-SR04 Ultrasonic Sensor User's Manual**



## **INTRODUCTION**

The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats or dolphins do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. From 2cm to 400 cm or 1" to 13 feet. Its operation is not affected by sunlight or black material like Sharp rangefinders are (although acoustically soft materials like cloth can be difficult to detect). It comes complete with ultrasonic transmitter and receiver module.

### **Features:**

- Power Supply :+5V DC
- Quiescent Current : <2mA
- Working Current: 15mA
- Effectual Angle: <15°
- Ranging Distance : 2cm – 400 cm/1" - 13ft
- Resolution : 0.3 cm
- Measuring Angle: 30 degree
- Trigger Input Pulse width: 10uS
- Dimension: 45mm x 20mm x 15mm

### **Pin configuration:**

VCC = +5VDC

Trig = Trigger input of Sensor

Echo = Echo output of Sensor

GND = GND

### **OPERATION:**

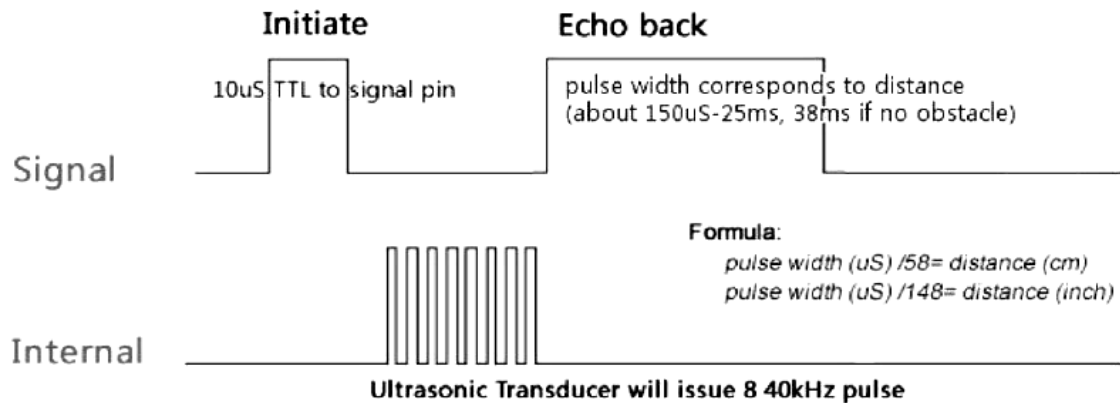
The timing diagram of HC-SR04 is shown. To start measurement, Trig of SR04 must receive a pulse of high (5V) for at least 10us, this will initiate the sensor will transmit out 8 cycle of ultrasonic burst at 40kHz and wait for the reflected ultrasonic burst. When the sensor detected ultrasonic from receiver, it will set the Echo pin to high (5V) and delay for a period (width) which proportion to distance. To obtain the distance, measure the width (Ton) of Echo pin.

Time = Width of Echo pulse, in uS (micro second)

- Distance in centimeters = Time / 58
- Distance in inches = Time / 148
- Or you can utilize the speed of sound, which is 340m/s

## PRODUCT SPECIFICATION AND LIMITATIONS

| Unit | Max | Typ. | Min  | Parameter            |
|------|-----|------|------|----------------------|
| V    | 5.5 | 5.0  | 4.50 | Operating Voltage    |
| mA   | 2.5 | 2    | 1.5  | Quiescent Current    |
| mA   | 20  | 15   | 10   | Working Current      |
| kHz  | -   | 40   | -    | Ultrasonic Frequency |



### Note:

- Please connect the GND pin first before supplying power to VCC.
- Please make sure the surface of object to be detected should have at least 0.5 meter<sup>2</sup> for better performance.